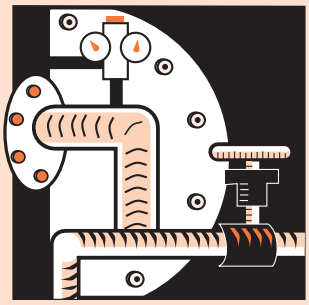

Insulation Optimization Software Available

The North American Insulation Manufacturers Association has developed a software package (3EPlus) that determines the optimum thickness for a wide variety of insulating materials. Outputs include the simple payback period, surface heat loss, and surface temperature for each specified insulation thickness. 3EPlus is available at no cost through the Information Clearinghouse.

Use Insulating Jackets

Removable insulating jackets are available for valves, flanges, steam traps, and other fittings. Remember that a 6-inch gate valve may have over 6 square feet of surface area from which to radiate heat.

Adapted from an Energy TIPS fact sheet that was originally published by the Industrial Energy Extension Service of Georgia Tech. For additional information on steam system efficiency measures, contact the Information Clearinghouse at (800) 862-2086.

Insulate Steam Distribution and Condensate Return Lines

Uninsulated steam distribution and condensate return lines are a constant source of wasted energy. The table shows typical heat loss from uninsulated steam distribution lines. Insulation can typically reduce energy losses by 90% and help ensure proper steam pressure at plant equipment. Any surface over 120°F should be insulated, including boiler surfaces, steam and condensate return piping, and fittings.

Insulation frequently becomes damaged or is removed and never replaced during steam system repair. Damaged or wet insulation should be repaired or immediately replaced to avoid compromising the insulating value. Eliminate sources of moisture prior to insulation replacement. Causes of wet insulation include leaking valves, external pipe leaks, tube leaks, or leaks from adjacent equipment. After steam lines are insulated, changes in heat flows can influence other parts of the steam system.

Heat Loss per 100 feet of Uninsulated Steam Line

Distribution Line Diameter (inches)	Heat Loss per 100 feet of Uninsulated Steam Line (MBtu/yr)			
	Steam Pressure (psig)			
	15	150	300	600
1	140	285	375	495
2	235	480	630	840
4	415	850	1,120	1,500
8	740	1,540	2,030	2,725
12	1,055	2,200	2,910	3,920

Based on horizontal steel pipe, 75ºF ambient air, no wind velocity, and 8,760 operating hr/yr.

Example

In a plant where the value of steam is $4.50 / MBtu, a survey of the steam system identified 1,120 feet of bare 1-inch diameter steam line, and 175 feet of bare 2-inch line both operating at 150 psig. An additional 250 feet of bare 4-inch diameter line operating at 15 psig was found. From the table, the quantity of heat lost per year is:

1-inch line: 1,120 feet x 285 MBtu / yr per 100 ft = 3,192 MBtu / yr
2-inch line: 175 feet x 480 MBtu / yr per 100 ft = 840 MBtu / yr
4-inch line: 250 feet x 415 MBtu / yr per 100 ft = 1,037 MBtu / yr
Total Heat Loss = 5,069 MBtu / yr

The annual operating cost savings from installing 90% efficient insulation is:

0.90 x $4.50/MBtu x 5,069 MBtu/yr = $20,530

Suggested Actions

Conduct a survey of your steam distribution and condensate return piping, install insulation, and start to save.

About DOE's Office of Industrial Technologies

The Office of Industrial Technologies (OIT), through partnerships with industry, government, and non-governmental organizations, develops and delivers advanced energy efficiency, renewable energy, and pollution prevention technologies for industrial applications. OIT is part of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

OIT encourages industry-wide efforts to boost resource productivity through a strategy called Industries of the Future (IOF). IOF focuses on the following nine energy and resource intensive industries:

Agriculture	Chemicals	Glass	Mining	Steel
Aluminum	Forest Products	Metal Casting	Petroleum	

To help industries begin to save energy, reduce costs, and cut pollution right away, IOF technical assistance programs offer a comprehensive portfolio of emerging technology, practices, tools, information, and resources in a variety of application areas, for example, motor systems, steam systems, compressed air systems, and combined heat and power systems. Likewise, IOF has Industrial Assessment Centers (IAC) throughout the U.S. that offer energy, waste, and productivity assessments to small and medium-sized manufacturers. Users can take advantage of the abundant resources, such as software, fact sheets, training materials, etc. available from the IOF technical assistance programs.

Motor Systems — helps industry increase productivity and reliability through energy-efficient electric motor-driven systems.

Documents -

- ☐ Buying an Energy-Efficient Electric Motor
- ☐ Optimizing Your Motor-Driven System
- ☐ Frequently Asked Questions on: The Impacts of the Energy Policy Act of 1992 on Industrial End Users of Electric Motor-Driven Systems
- ☐ Energy Management for Motor Driven Systems
- ☐ Improving Pumping System Performance: A Sourcebook for Industry

Software –

- ☐ MotorMaster+ 3.0 and training CD
- ☐ ASDMaster
- ☐ Pumping System Assessment Tool

Training –

- ☐ MotorMaster+ 3.0 Software
- ☐ Adjustable Speed Drive Application
- ☐ Pumping System Optimization
- ☐ Pumping System Assessment Tool

Access the Web site at ***www.motor.doe.gov***.

Steam Systems — helps industry enhance productivity, increase profits, and reduce emissions through better steam system management.

Documents –

- ☐ Energy Efficiency Handbook
- ☐ Plant Services Article - *The Steam Challenge*
- ☐ Energy Manager Article - *Steaming Ahead*
- ☐ Oak Ridge National Laboratory's Insulation Guidelines
- ☐ 1998 IETC Steam Session Papers

Case Studies –

- ☐ Georgia Pacific Achieves 6-Month Payback
- ☐ Bethlehem Steel Showcase Demonstration

Software –

- ☐ 3EPlus Software for Determining Optimal Insulation Thickness

Access the Web site at ***www.oit.doe.gov/steam***.

Compressed Air Systems — dedicated to improving the efficiency and performance of industrial compressed air systems.

Documents –

- ☐ Improving Compressed Air System Performance: A Sourcebook for Industry

Training –

- ☐ Fundamentals of Compressed Air Systems (For schedule and location, call (800) 862-2086)

Access the Web site at ***www.knowpressure.org***.

Industrial Assessment Centers — enable small and medium-sized manufacturers to have comprehensive industrial assessments performed at no cost to the manufacturer.

Documents –

- ☐ IAC Database

Access the Web site at ***www.oit.doe.gov/iac***.

For more information, simply check the box next to the product, fill out the form below and fax back to (360) 586-8303:

Name: _____ Title: _____

Organization: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ E-mail: _____

Comments: _____

For more information on Motor, Steam, Compressed Air Systems, and IACs, call the Information Clearinghouse at (800) 862-2086. For overall OIT and IOF information, contact the OIT Resource Room at (202) 586-2090 or access the Web site at *www.oit.doe.gov*.